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JOURNAL OF

THE NEW ENGLAND BOTANICAL CLUB

Vol. 53 August, 1951 No. 632

CALLITRICHE IN THE NEW WORLD

NORMAN C. FASSETT

(*continued from p. 182*)

14. **C. quindiensis,** n. sp., fructibus 1.4–1.5 mm. latis, 1.2–1.4 longis, nitidis, non alatis, sessilibus (Figs. 14a–14c).—**Colombia:** pool on moor, alt., 4100–4300 m., Paramo del Quindío, Dept. Caldas, Aug. 15–20, 1922, *Pennell & Hazen 9850* (TYPE in GH; ISOTYPES in US, NY).

As is true for any species of the Sect. Callitriche known from a single collection, we can only describe the habit and vegetative characters of that individual, and speculate on possible variation by analogy with other species.

The type collection is from a pool on the high paramo. Several large clumps of intertwined stems on each sheet suggest that it made a dense growth in the water. All the lower leaves are gone, only the spatulate or oblanceolate-obovate leaves 1–2.5 mm. wide remaining on the uppermost few centimeters of stem. The stems appear coarser than is common in the genus. Both stems and leaves have blackened extensively; this may be due to a fleshy nature, or it may only reflect the difficulties of drying a wet mass of aquatic vegetation in the mountains of Colombia.

15. **C. hamulata** Kütz. apud Reichenb. Icon. Fl. Germ. 5: 1, pl. CXXX, figs. a–c. 1841; Hegelm. Monogr. Callit. 56. 1864; Hegelm. Verhandl. Bot. Ver. Brandenburg 9: 29. 1867; Samuelsson, Fest. Carl Schröter 627. 1925. *C. autumnalis* Kütz. in Reichenb. Pl. Crit. 9: pl. DCCCXC. 1831, not L. *C. intermedia* Hoffm. according to Pearsall, Rep. Bot. Soc. & Exch. Club Br. Isles 10: 865. 1935. (*C. intermedia* Hoffm. Deutsch. Fl. 2. 1791 is not identifiable, only the foliage being described. Hoffmann refers to Schkuhr, Bot. Handb. t. I, fig. e. 1791, which, again, might be any of several species).—Fruit 0.9–1.2 mm. wide and about as high, with sides nearly parallel and faces rather flat; margins of carpels with a narrow but well-differentiated and even

wing (Fig. 15b); commissural groove very wide, often flat across its base (Fig. 15a); style long and sharply reflexed from well below the summit of the carpel (Fig. 15b), often caducous but usually leaving a visible stub; leaves variable but predominantly of the linear submersed type; linear 1-nerved leaves deeply bidentate at tip, with the enlarged gland-like tip of the nerve slightly excurrent (Fig. 15d).—Europe; but one clearly identifiable collection seen from the New World, in **Greenland:** Vest-Grønland, Nordkysten af Sarqardleg, 68° 42′ N. 52° 30′ W., Aug. 13, 1932, *Porsild* (MO, US, GH).

The variations in leaf type and habit, closely paralleling those of *C. heterophylla*, are described by Glück, l. c. This species is generally more slender and delicate than *C. heterophylla*, more closely resembling *C. anceps* in this respect. The single collection cited above has only linear 1-nerved leaves and looks like Fig. 6 on Plate 1168. There are other similar plants from Greenland, with fruits less well-developed; they may be this species or may be *C. anceps*.

PLATE 1173

(Numbers same as in keys and descriptions)

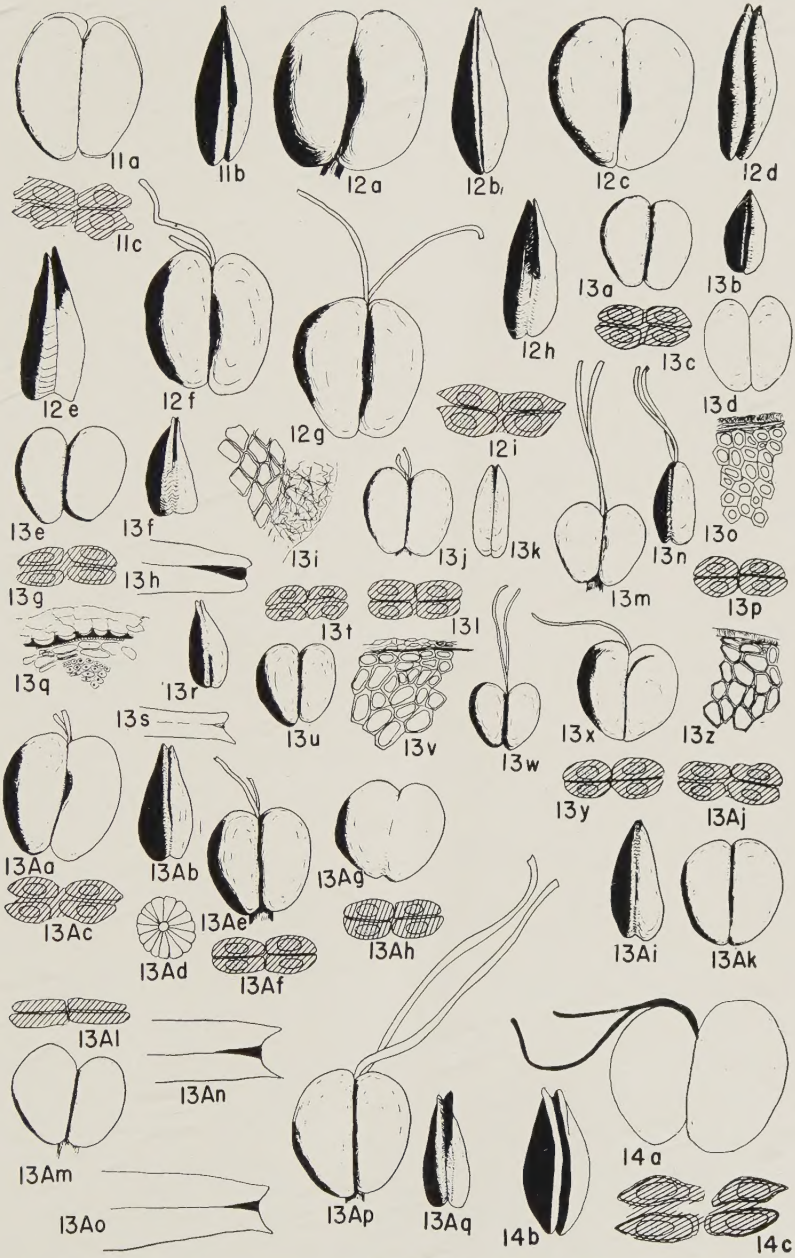
11. *C. albomarginata.* 11a. Face of fruit, × 30. Chile, *Reich* in 1899 (GH). 11b. Edge view of fruit, × 30. Same collection. 11c. Cross-section of fruit, × 30. Same collection.

12. *C. heteropoda.* 12a. Face of fruit, × 30. Bolivia, *Kuntze* (NY). 12b. Edge view of fruit, × 30. Same collection. 12c. Face of fruit, × 30. Bolivia, *Buchtien 8436* (NY). 12d. Edge view of fruit, × 30. Same collection. 12e. Edge view of fruit, × 30. Same collection. 12f. Face of fruit, × 30. Same collection (US). 12g. Face of fruit, × 30. Bolivia, *Bang 1887* (US). 12h. Edge view of fruit, × 30. Same collection. 12i. Cross-section of fruit, × 30. Same collection.

13. *C. heterophylla* var. *heterophylla.* 13a. Face of fruit, × 30. New York, *Muenscher & Bechtel 257* (US). 13b. Edge view of fruit, × 30. Same collection. 13c. Cross-section of fruit, × 30. Same collection. 13d. Face of fruit, × 30. Maryland, *McAtee 2697* (US). 13e. Face of fruit, × 30. Virginia, *McAtee 3379* (US). 13f. Edge view of fruit, × 30. Same collection. 13g. Cross-section of fruit, × 30. Same collection. 13h. Leaf tip, × 30. Same collection. 13i. Portion of wing and face of fruit, × 187.5. Virginia, *Robinson 323* (GH). 13j. Face of fruit, × 30. Tennessee, *McDougal 1261* (US). 13k. Edge view of fruit, × 30. Same collection. 13l. Cross-section of fruit, × 30. Same collection. 13m. Face of fruit, × 30. Tennessee, *Svenson 10117* (US). 13n. Edge view of fruit, × 30. Same collection. 13o. Portion of wing and face of fruit, × 187.5. Same collection. 13p. Cross-section of fruit, × 30. Same collection. 13q. Section of pericarp, seed-coat, endosperm and embryo, × 187.5. From section of fresh material from Baxter's Hollow, Baraboo, Wisconsin. 13r. Edge view of fruit, × 30. Maine, *Harvey 345–1* (US). 13s. Leaf tip, × 30. Same collection. 13t. Cross-section of fruit, × 30. Same collection. 13u. Face of fruit, × 30. Same collection. 13v. Portion of wing and face of fruit, × 187.5. Same collection. 13w. Face of fruit, × 30. Louisiana, *Palmer 7403* (US). 13x. Face of fruit, × 30. Arkansas, *Haas 2006* (US). 13y. Cross-section of fruit, × 30. Same collection. 13z. Portion of wing and face of fruit, × 187.5. Same collection.

13A. *C. heterophylla* var. *Bolanderi.* 13Aa. Face of fruit, × 30. Washington, *Piper 686* (US). 13Ab. Edge view of fruit, × 30. Same collection. 13Ac. Cross-section of fruit, × 30. Same collection. 13Ad. Peltate scale from leaf, × 30. Oregon, *Nelson 2095* (GH). 13Ae. Face of fruit, × 30. Oregon, *Hall 461* (MO). 13Af. Cross-section of fruit, × 30. Oregon, *Nelson 2095* (GH). 13Ag. Face of fruit, × 30. California, *Bioletti* (NY). 13Ah. Cross-section of fruit, × 30. Same collection. 13Ai. Edge view of fruit, × 30. California, *Newbery* (US). 13Aj. Cross-section of fruit, × 30. Same collection. 13Ak. Face of fruit, × 30. Same collection. 13Al. Cross-section of fruit, × 30. California, *Bolander 4528* (US). 13Am. Face of fruit, × 30. Same collection. 13An. Leaf tip, × 30. Same collection. 13Ao. Leaf tip, × 30. Same collection. 13Ap. Face of fruit, × 30. California, *Tracy 4038* (NY). 13Aq. Edge view of fruit, × 30. Same collection.

14. *C. quindiensis.* 14a. Face of fruit, × 30. Colombia, *Pennell & Hazen 9850* (US). 14b. Edge view of fruit, × 30. Same collection. 14c. Cross-section of fruit, × 30. Same collection.



Callitriche. 11, C. albomarginata. 12, C. heteropoda. 13, C. heterophylla. 14, C. quindiensis.

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16. **C. anceps** Fernald, Rhodora 10: 51. 1908; Fernald in Gray's Manual, ed. 8: 974. 1950.—Fruits 0.7–1.0 mm. wide, 0.6–1.1 mm. high, the sides nearly straight and parallel (Figs. 16b, 16d, 16h) or somewhat rounded (Figs. 16f, 16i); mericarps with rounded margins (Figs. 16a, 16c, 16g, 16j), wingless or very narrowly winged (Fig. 16i); edges of carpels usually in contact (Fig. 16a), rarely with a shallow commissural groove (Fig. 16j); styles erect or ascending, caducous or persistent; leaves sometimes all linear and 1-nerved (Plate 1169, Figs. 3, 5, 6, 7, 9) or all broad and rounded (Plate 1169, Fig. 4), or with both types on the same plant, or tongue-like on semiterrestrial individuals (Plate 1169, Fig. 1); linear 1-nerved leaves bidentate at tip, with the enlarged gland-like end of the vein slightly exserted (Fig. 16e).—Western Greenland to northern New England, rarely to Georgia in the mountains, and from Alaska to Washington and the mountains of Utah.—**Greenland:** S. Disko, Godhavn, 69° 15′ Lat. bor., Aug. 31, 1923, *Porsild* (GH, NY); Kangikitsum Quingua, 60° 18′ N., July 24, 1925, *Porsild & Porsild* (MO); Frederiksdal, 60° 0′ N., July 25, 1925, *Porsild & Porsild* (GH, US); S. Disko, near Arktisk Station, 69° 15′ N., Aug. 6, 1929, *Porsild* (GH, CM, US, MO); east coast of Disko Island, Mudderbugtsdalen, Aug. 4–5, 1937, *Porsild 391* (GH). **Labrador:** Battle Harbor, Aug. 26, 1928, *Bishop 409* (GH); Battle Harbor, Aug. 9, 1911, *Williamson 673* (NY); Blanc Sablon River, Straits of Belle Isle, Aug. 2, 1910, *Fernald & Wiegand 3648* (GH) and *3649* (GH, NY); Blanc Sablon River, Straits of Belle Isle, Sept. 3, 1925, *Fernald, Wiegand & Long 28640* (GH) and *28641* (GH), Sept. 4, 1925, *28642* (GH). **Newfoundland:** Green's Harbor, *Waghorne* (GH); Whitbourne, Aug. 15, 1894, *Robinson & Schrenk 215* (GH, CM, NY, US, MO); Torbay, Aug. 21–26, 1901, *Howe & Lang 1398* (GH, NY—some fruits approaching *C. heterophylla* or *C. verna*); Blomidon Mountains, Bay of Islands, Aug. 22, 1910, *Fernald & Wiegand 3657* (GH); Harbor Grace, July 30, 1911, *Williamson 499* (NY); between Quiddy Viddy Lake and Middle Cove, Aug. 1, 1911, *Fernald & Wiegand 5812* (GH); Killigrew's, Conception Bay, Avalon Peninsula, Aug. 3, 1911, *Fernald & Wiegand 5818* (GH); Brigus Junction, Collier's River, Avalon Peninsula, Aug. 5, 1911, *Fernald & Wiegand 5813* (GH—young fruits approach *C. heterophylla* & *C. verna*); Whitbourne, Rocky River, Avalon Peninsula, Aug. 8, 1911, *Fernald & Wiegand 5815* (GH); Rushy Pond, Exploits River, Aug. 11, 1911, *Fernald & Wiegand 5816* (GH, US); Grand Falls, Exploits River, Aug. 15, 1911, *Fernald & Wiegand 5817* (GH, CM, NY, MO, UC—some with a few fruits approaching *C. heterophylla*); Clarenville, Random Sound, Trinity Bay, Aug. 19, 1911, *Fernald & Wiegand 5814* (GH); Bard Harbor, St. John Bay, Aug. 26, 1925, *Gilbert & Hotchkiss 28638* (GH); Burgeo, Sept. 9, 1926, *Fernald, Long & Fogg 314* (GH); Burgeo, Sept. 10, 1926, *Fernald, Long & Fogg 315* (GH) and *316* (GH); Deer Brook, Bonne Bay, Aug. 26, 1929, *Fernald, Long & Fogg 1850* (GH); Cappa Hayden, Sept., 1934, *Ayre* (GH—some fruits approach *C. heterophylla*). **St.-Pierre et Miquelon:** Yoiles Blanches (Langlade), Sept. 5, 1935, *LeHors* (GH). **Quebec:** River Etamamiou, Charney, Labrador Peninsula, Saguenay Co., Aug. 28, 1915, *St. John 90578* (GH); Fort Chimo area, 58° 07′ N, 68° 23′ W, Aug. 17, 1948, *Calder 2671* (WIS); Richmond Gulf, east coast of Hudson Bay, 56° 10′ N, 78° 50′ W, Aug. 19, 1944, *Dutilly & Lepage 13248* (WIS); Fort Georges, east coast of Hudson Bay, Aug. 25, 1944, *Dutilly & Lepage 13351* (WIS); Lac Turgeon, Parc des Laurentides, Charlevoix Co., Aug. 22, 1940, *Desmarais 495* (WIS); Kondiaronk, près des sources de la riviere Ouiatchouan, Lac Saint-Jean, Aug. 21, 1922, *Victorin 16264* (GH); Lac des Américains, Table-top Mountain, Gaspé Co., Aug. 1, 1906, *Fernald & Collins 234* (GH—Type, US, NY); Table-topped Mountain, Gaspé Co., Aug. 4,

1906, *Fernald & Collins 637* (GH) and Aug. 8, 1906, *638* (GH); Tabletop Mts., Aug. 11, 1923, *Fernald, Dodge & Smith 25878* (GH, US, NY, CM) and *25879* (NY); Mt. Tabletop, Aug. 6–9, 1934, *Louis-Marie et al. 34358* (GH); Lac Sainte-Anne, Gaspé Co., July 28, 1930, *Victorin, Rolland & Jacques 33514* (GH); Rivière Petite Cascapedia, Aug. 13, 1930, *Victorin, Rolland & Jacques 33330* (GH); Rivière Cap Chat, Matane Co., Aug. 27, 1923, *Fernald & Smith 25877* (GH); between Mts. Mattaouisse, Fortin and Logan, Matane Co., Aug. 21, 1923, *Fernald & Smith 25879* (GH); Pease Basin between Mts. Logan and Pembroke, Matane Co., Aug. 24, 1923, *Fernald & Smith 25880* (GH); Tadousac Lake, Aug. 8, 1892, *Kennedy ?* (GH); Lake Aylmer, Garthby, Sept. 17, 1940, *Pease 28512* (GH). **Nova Scotia:** Antigonish, Aug. 26, 1924, *Fassett 2285* (GH); Charcoal, Pictou Co., Aug. 2, 1913, *St. John 1432* (GH); Arcadia, Yarmouth Co., July 20, 1920, *Fernald & Long 21763* (GH); Springhaven, Yarmouth Co., Oct. 8, 1920, *Fernald & Linder 21767* (GH); Tusket, Yarmouth Co., July 15, 1920, *Long & Linder 21769* (GH); Tusket Falls, Oct. 7, 1920, *Fernald & Linder 21768* (GH). **Maine:** East Livermore, Androscogin Co., 1887, *Parlin* (NEBC); Lambert Lake, Washington Co., Sept. 1, 1908, *Fernald* (NEBC); Rangeley Lake, Franklin Co., Aug., 1894, *Furbish* (NEBC); South Poland, Sept. 3, 1893, *Furbish* (NEBC); Edmunds, Washington Co., Aug. 18, 1928, *Knowlton* (NEBC). **New Hampshire:** White Mountains, in Saco River, *Tuckerman* (GH, approaching *C. heterophylla* and with comment by Engelmann—"I am at a loss about this plant, and should like to see more of it. It has the rounded plump fruit of C. Asae Grayi, but much larger than all the forms of this plant I have examined, besides it comes from a Region much north of the Habitat of Asae Grayi, and mountainous too, where I would except only C. verna. G. E. Sept. 1864;" NY); Saco River, Willey House, Carroll Co., Aug. 31, 1937, *Fassett 18822* (NEBC, WIS); Ravine House Pond, Randolph, Coös Co., Sept. 2, 1925, *Pease 19895* (NEBC); Watson Pond, Randolph, Sept. 20, 1904, *Pease 4170* (NEBC); S. Lake, Carter Notch, Bean Purchase, Coös Co., Aug. 2, 1932, *Pease 22999* (NEBC, GH); brook near Lake Winnepesaukee, Alton, Aug. 4, 1909, *Sargent 84* (GH—approaching *C. heterophylla* in some fruits); Newport, Sept. 15, 1899, *Robinson 913* (GH); Dismal Pool, White Mts., Aug. 26, 1882, *Faxon* (GH, NEBC marked "near Glen Ellis . . . Pinkham Notch"); Peterboro, Hillsboro Co., Aug. 10, 1909, *Deane & Batchelder* (NEBC); Rindge, Aug. 8, 1918, *Batchelder* (NEBC). **Vermont:** Lake of the Clouds, Mt. Mansfield, Aug. 6, 1877, *Faxon* (GH). **Massachusetts:** pond on summit of Mt. Wachusett, Princeton, Aug. 8, 1894, *Collins* (GH); Mt. Wachusett, Aug. 16, 1894, *Bailey* (NEBC). **New York:** Colton Flow, Raquette River, St. Lawrence Co., Sept. 2, 1933, *Muenscher & Clausen 3910* (GH). **Georgia:** Little Stone Mountain, shallow pools along Covington Road, 20 miles east of Atlanta, DeKalb Co., April 17, 1936, *Svenson 7507* (GH). **Utah:** Diamond Lake west of Bald Mountain, Aug. 10, 1941, *Harrison 10461* (UC); Duck Lake, N. W. slope Lamotte Peak, Summit Co., Aug. 15, 1933, *Hermann 5929* (MO, UC—identification not positive). **Alaska:** Smith's Dry Lake, Attu Is., Aleutians, Sept. 14, 1945, *Hardy 387* (UC, MO); Seward Peninsula, north coast, Buckland River, 26 miles above delta, 66° N., 161° 4′ W., Sept. 7–10, 1926, *Porsild & Porsild 1595* (US). **Washington:** Mt. Ranier, alt. 5500 ft., Oct. 14, 1895, *Allen 185* (NY, US, GH, MO, CM, UC).

In reporting *C. anceps* from Mt. Mansfield, Vermont, its author[1] wrote: "In the original discussion the following possibly

[1] Rhodora 35: 185–186. 1933.

16. *C. anceps* (also in the Aleutian Islands).

helpful phrase occurs: 'distinguished from *C. heterophylla* by its small size, uniform foliage, ancipital stem, and promptly deciduous styles.' Subsequently plants with dilated foliage have been found but the ancipital stems and caducous styles are distinctive." The ancipital stems may be distinctive in the fresh plants, but in both *C. anceps* and *C. heterophylla*, as well as in most of the Sect. Callitriche, the stems press very flat and thin with the

central cylinder easily distinguishable; in the pressed condition no difference can be seen except that the stem of *C. anceps* averages a little more slender than that of *C. heterophylla.* Styles may be either caducous or persistent in both species. That *C. anceps* is generally smaller and more delicate than *C. heterophylla* may be seen from a comparison of Figs. 1–9, Plate 1168, with Figs. 1–10, Plate 1169, however, this difference is not such that it can be reduced to contrasting measurements of widths of leaves or thicknesses of stems.

The most fundamental difference between *C. heterophylla* and *C. anceps* appears to be in the shape of the fruit. In the former, the fruit is slightly narrower below the middle than above the middle (Figs. 13a, 13d, 13e, 13g, 13m, 13x) while in *C. anceps* they are essentially the same width below as above the middle (Figs. 16b, 16d, 16f, 16h, 16i). Magnification of 15–20 times is necessary for proper observation of this character. At least as much magnification is also necessary to examine the tips of the linear submersed leaves, whose veins are slightly more excurrent in *C. anceps* (Fig. 16e) and *C. hamulata* (Fig. 15d) than in *C. heterophylla* (Figs. 13h, 13s, 13An, 13Ao).

C. anceps has been confused with *C. hamulata* and *C. verna* in Greenland. In Newfoundland, it has commonly been identified as *C. heterophylla,* and most of what has been called *C. heterophylla* in Nova Scotia proves to be *C. anceps.*

While most *C. anceps* is sufficiently distinct from *C. heterophylla* on these fundamental, albeit minute, characters, a few individuals in Newfoundland and in New Hampshire show some approach to *C. heterophylla.* Sometimes this is due to distortion of young fruits in pressing, but occasionally mature fruits are intermediate, or approach both forms on the same plant. Conversely, much of the *C. heterophylla* from the Pocono Plateau in Pennsylvania shows a strong tendency toward *C. anceps.*

To a large extent, *C. anceps* combines the characters of the northern and European *C. hamulata* with the more southern *C. heterophylla;* the shape of the fruit, the nature of the leaf tip, and the general slenderness of the plants are a close match for the former, while the ascending styles and lack of wing on the carpels agrees with the latter.

17. **C. nubigena,** n. sp., fructibus subrotundis, 0.7–1.2 mm. diametro, sessilibus vel subsessilibus; mericarpellis nitidis, marginibus angulatis non alatis. —Fruit nearly round (Figs. 17a, 17e), 0.7–1.2 mm. in diameter, sessile or nearly so; faces of mericarps rather plump (Figs. 17b, 17f), and margins angled but not winged; commissural groove widely V-shaped; aquatic forms with long lax stems and submersed linear 1-nerved leaves, submersed spatulate leaves, and submersed or floating rotund petioled leaves occurring in different combinations on different plants; subterrestrial plants mat-like on the mud, with spatulate or oblanceolate or obovate leaves.— **Colombia:** Department Santander: pool on paramo, Alto del Almorzadero, north of Cerrito, alt. 12000 ft., Oct. 12, 1944, *Fassett 25918* (TYPE in MO; ISOTYPE in GH), and *25916* (WIS, CM, NY, US, MO); aquatic form in 20 cm. water, pool in pasture, "Moravia," a level valley northeast of LaBelleza, valley of Rio Minero near Florian, alt. 7000 ft., Sept. 26, 1944, *Fassett 25808* (GH, MO), and subaquatic form, *25809* (GH, MO), and terrestrial form on mud, *25807* (GH, MO); small shallow pool, half-way between Sucre and LaBelleza, alt. 7650 ft., Sept. 25, 1944, *Fassett 25796* (WIS, UC, US, CM).

These collections are from two regions about 125 miles apart, and perhaps represent two species if we may judge from the sizes of the fruits. Collections nos. 25918 and 25916 are from the Alto del Almorzadero, some 35 miles southeast of Bucaramanga. Here is treeless paramo at 12000 feet elevation, bleak, cold and fog-drenched. The plants grew in a pool not over 100 feet across. The fruits on these collections are from 9–12 mm. high and wide.

The other collections are from a region called "Moravia," about 25 miles southwest of Vélez. The elevation is only about 7000 feet. The valley has low eroded sandstone cliffs along the sides, and the valley-floor is flat with a meandering stream with steeply cut banks and occasional old oxbows. The sides are wooded, while the floor is more open and pastured, with pools or sedge and marsh vegetation in the oxbows. To the writer's eye, the superficial resemblance to the valleys in Wisconsin's Driftless Area was striking. The *Callitriche*, growing in and around a shallow oxbow pool, has fruits only 0.7–0.8 mm. high and wide.

The difference in size of fruits is consistent with differences between some species. On the other hand, this variation is well within the size ranges in *C. heterophylla* in California. With effectively only two collections available it seems wiser to take the more conservative course at present.

18. **C. Lechleri** (Hegelm.) n. comb. *C. marginata* γ *Lechleri* Hegelm. Verhandl. Bot. Ver. Brandenburg 9: 12. 1867.—Fruit 1.0–1.4 mm. wide, 1.0–1.2 mm. high, the width equalling or, more frequently, slightly exceeding the

height; carpels distinctly winged (Figs. 18a, 18d, 18e, 18g, 18k); mericarps with plump faces (Figs. 18b, 18e, 18f, 18h) and with a wide V-shaped commissural groove; leaves and habit variable, essentially as described under *C. heterophylla.*

a. Fruits sessile or nearly so.....*C. Lechleri* var. *Lechleri.*
a. Fruits peduncled.....*C. Lechleri* var. *Berteroana.*

C. Lechleri var. **Lechleri.** *C. marginata γ Lechleri* Hegelm. l. c.—Central and southern Chile and adjacent Argentina.—**Chile:** Rancagua, May, June, 1828, *Bertero 142* (MO, GH, NY—COTYPES); 40 Kilom. al Este de Valparaíso, January, 1916, *Jaffuel 357* (GH, mixed with var. *Berteroana*); San Miguel, Concepcion, Nov. 11, 1933, *Barros 125* (GH); Temuco, Prov. Cautin, about 120 m. alt., Dec. 15, 1935, *Montero 2589* (GH); Valdivia, ex herb. John Ball (GH); Costa, Nov. 4, 1920, *Claude-Joseph 1232* (US); Volcan Tolguaca, Prov. Malleco, Feb. 23–25, alt. 1200 m., *Pennell 12795* (CM). **Argentina:** Cordilleras del Chubut, Feb., 1903, *Illin* (UC); Rio Corcovado, Território del Chubut, March 8, 1901, *Illin 113* (SP); Prov. Magallanes, Jan., 1931, *Hicken 487* (GH); región del Lago Nahuel Huapí, Bariloche, Feb. 12, 1940, *Cabrera 6097* (LP).

C. Lechleri var. **Berteroana** (Hegelm.) n. comb. *C. Berteroiana* Steud. Nom. ed. 2, 1: 259. 1840, *nomen nudum* but a type cited. *C. marginata β Berteroana* Hegelm. l. c. *C. Berteroana* Steud. ex Hegelm. l. c., in synonymy. —Central **Chile:**—Rancagua, *Bertero 141* (ISOTYPE of *C. Berteroiana* Steud.—GH, MO); without locality, *Gay* (MO); 40 Kilom. al Este de Valparaíso, Jan. 1916, *Jaffuel 357* (GH, mixed with var. *Lechleri*); Valle de Marga-Marga, Prov. Aconcagua, southeasterly from Valparaiso, *Jaffuel & Pirion 3208* (GH).

PLATE 1174

(Numbers same as in keys and descriptions)

15. *C. hamulata.* 15a. Cross-section of fruit, × 30. Greenland, *Porsild* on 13 Aug. 1932 (US). 15b. Face of fruit, portion of stem and leaves, × 30. Same collection. 13c. Edge view of fruit, × 30. Same collection. 13d. Leaf tip, × 30. Same collection.

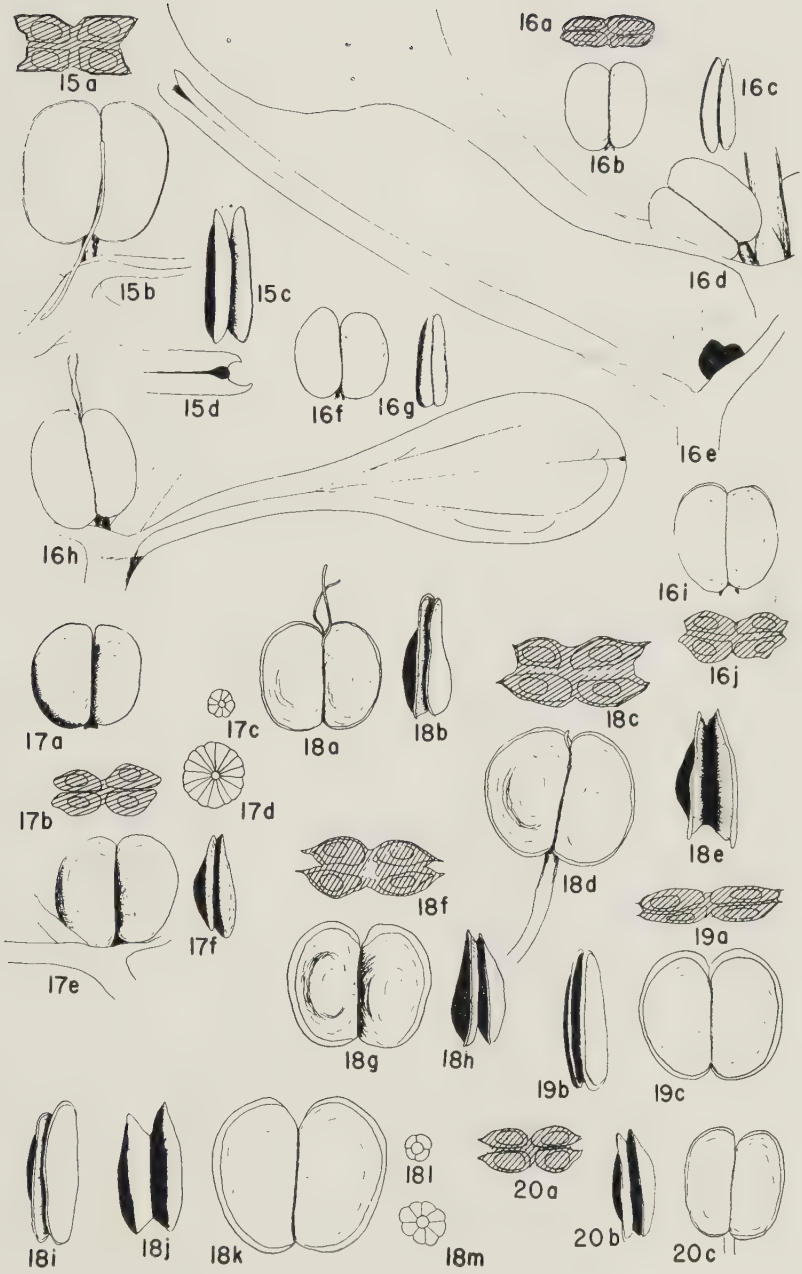
16. *C. anceps.* 16a. Cross-section of fruit, × 30. Quebec, *Fernald, Dodge & Smith 25878* (GH). 16b. Face of fruit, × 30. Same collection. 16c. Edge view of fruit, × 30. Same collection. 16d. Face of fruit, and part of leaf and stem, × 30. New Hampshire, *Robinson* (GH). 16e. Young fruit, part of stem, and linear 1-nerved leaf, × 30. Quebec, *Fernald & Smith 25877* (GH). 16f. Face of fruit, × 30. Labrador, *Fernald & Long 28642* (GH). 16g. Edge view of fruit, × 30. Same collection. 16h. Face of fruit, leaf and portion of stem, × 30. Nova Scotia, *Fernald & Linder 21767* (GH). 16i. Face of fruit, × 30. New Hampshire, *Faxon* (GH). 16j. Cross-section of fruit, × 30. Same collection.

17. *C. nubigena.* 17a. Face of fruit, × 30. Colombia, *Fassett 25807* (WIS). 17b. Cross-section of fruit, × 30. Colombia, *Fassett 25918* (WIS). 17c. Peltate scale from leaf, × 187.5. Colombia, *Fassett 25796* (WIS). 17d. Peltate scale from leaf, × 187.5. Same collection. 17e. Face of fruit, × 30. Colombia, *Fassett 25918* (WIS). 17f. Edge view of fruit, × 30. Same collection.

18. *C. Lechleri.* 18a. Face of fruit, var. *Lechleri*, × 30. Chile, *Barros 125* (GH). 18b. Edge view of fruit, × 30. Same collection. 18c. Cross-section of fruit, var. *Berteroana*, × 30. Chile, *Jaffuel & Piron 3208* (GH). 18d. Face of fruit, × 30. Same collection. 18e. Edge view of fruit, × 30. Same collection. 18f. Cross-section of fruit, var. *Berteroana*, × 30. Chile, *Jaffuel 357* (GH). 18g. Face of fruit, × 30. Same collection. 18h. Edge view of fruit, × 30. Same collection. 18i. Edge view of fruit, var. *Berteroana*, × 30. Chile, *Bertero 141* (GH). 18j. Edge view of fruit, × 30. Same collection. 18k. Face of fruit, × 30. Same collection. 18l. Peltate scale from leaf, × 187.5. Same collection. 18m. Peltate scale from leaf, × 187.5. Same collection.

19. *C. trochlearis.* 19a. Cross-section of fruit, × 30. California, *Harris, Tracy & Yates 3454* (US). 19b. Edge view of fruit, × 30. Same collection. 19c. Face of fruit, × 30. Same collection.

20. *C. oblongicarpa.* 20a. Cross-section of fruit, × 30. Argentina, *Parodi 8571* (GH). 20b. Edge view of fruit, × 30. Same collection. 20c. Face of fruit, × 30. Same collection.



CALLITRICHE. 15, C. XAMULATA. 16, C. ANCEPS. 17, C. NUBIGENA. 18, C. LECHLERI. 19, C. TROC. LEARIS. 20, C. OBLONGICARPA.

18 (left). *C. Lechleri* var. *Lechleri* (dots). 18a (right). *C. Lechleri* var. *Berteroana* (crosses). 20 (right). *C. oblongicarpa* (triangles).

The taxonomy of *C. Lechleri* has had a history of confusion. According to Hegelmaier, as previously stated in this paper under *C. turfosa*, these plants were treated by Bertero as conspecific with *C. turfosa*. Hegelmaier separated the two varieties of *C. Lechleri* from *C. turfosa*, but he treated them as varieties under *C. marginata*.

Now *C. Lechleri* is of the Sect. *Callitriche*, while both *C. turfosa* and *C. marginata* belong to the Sect. *Microcallitriche*. It happens that many fruits of *C. Lechleri* are broader in relation to their height than is the case in most of the *Callitriche*, and the mistake was a natural one. It was the writer's experience to soften and dissect many plants, and to boil many leaves in alcohol and stain for peltate scales, before he reached the conclusion that both sections were represented in the jumble of superficially similar plants finally separated into *C. turfosa*, *C. Lechleri*, *C. oblongicarpa* and *C. rimata*.

C. Berteroiana Steud. was a *nomen nudum*, but his single cited specimen, *Bertero 141*, clearly fixes the application of the name. Hegelmaier used the name in connection with a description, which would have validated it had he not cited it as a synonym of *C. marginata β Berteroana*. It seems better, after two still-

births, to let it lie in its grave and treat the plant as *C. Lechleri* var. *Berteroana*, basing the name on Hegelmaier's use in the varietal category.

Hegelmaier's descriptions of *C. turfosa*, *C. marginata* γ *Lechleri* and *C. marginata* β *Berteroana* are insufficient in diagnostic characters to set definitely the applications of the names. A few of the most critical of the cited specimens have been seen, and used to fix the applications of names.

19. **C. trochlearis,** n. sp., fructibus rotundis, 1.0–1.2 mm. diametro; marginibus mericarpellorum manifeste alatis, faciebus planis.—Fruit nearly round, 1.0–1.2 mm. in diameter; mericarps distinctly winged (Figs. 19a, 19b, 19c), with flat or slightly plump faces, and a shallow U-shaped commissural groove (Fig. 19a); aquatic forms with linear 1-nerved leaves below, broader subpetiolate leaves at the upper intermodes and in a floating rosette; stranded plants forming a mat on the mud, with spatulate leaves.—Coast Ranges of **California:** Buck Mt., 2700 ft. elevation, Humboldt Co., June 17, 1936, *Harris, Tracy & Yates 3454* (Type in GH, Isotype in US); Buck Mt., 2500 ft., June 17, 1936, *Tracy 14952* (UC); Eureka, Humboldt Co., May 28, 1900, *Tracy 824* (UC); Ukiah, Mendocino Co., April 18, 1866, *Bolander 4658* (MO, US, NY, UC); Cazadero, Sonoma Co., March 14, 1896, *Davy 1665* (UC).

This has been identified sometimes as *C. Bolanderi*, sometimes as *C. verna* or *C. palustris*. It somewhat resembles the former in the size of the fruit, but the fruit is more rotund: the wing resembles that of the latter but is more fully developed around the whole carpel.

20. **C. oblongicarpa,** n. sp., fructibus 0.7–0.9 mm. latitudine, 0.8–0.9 mm. altitudine, suboblongatis; mericarpellis nitidis (Fig. 20b), anguste alatis (Fig. 20c); commissura in forma V (Fig. 20a).—Fruit 0.7–0.9 mm. wide, with nearly parallel sides, the height equalling or slightly exceeding the width (Fig. 20c); mericarps narrowly and often obscurely winged, plump on the face (Figs. 20a, 20b) and with a wide V-shaped commissural groove; pedicels nearly lacking, or as long as 1 cm., variable in length on the same plant.—In the low country about the mouth of Rio de la Plata.—**Uruguay:** Minas, Oct. 3, 1937, *Rosengurt A1353* (CM). **Argentina:** La Plata, Prov. de Buenos Aires, Oct. 20, 1928, *Parodi 8571* (Type in GH).

The two collections both represent aquatic forms with obovate leaves, of the general type shown in Plate 1168, Fig. 2.

(*to be concluded*)

MAPPING RANGES OF THE TREES OF THE UNITED STATES

Elbert L. Little, Jr.

A map is the clearest and most concise method of showing accurately the geographic distribution of a plant species. In comparison the ranges by States given in manuals seem vague and incomplete. Though obviously no more accurate than the original data, a map appears so definite that it may give a false impression. A map correct to minute details would require records from an infinite number of localities.

Botanists, foresters, and other authors bold enough to summarize plant distribution records graphically may expect criticism instead of reward for their efforts. It is far easier to detect a minor flaw along a boundary line than to prepare a better map. The late Professor M. L. Fernald (1950) recently cited a number of inaccuracies in the distribution maps in Preston's North American Trees (1948). (Some of these maps have been revised in the 1950 printing of this book.)

Forest Service Tree Distribution Maps

The United States Forest Service has long been interested in the distribution of the native trees. George B. Sudworth (1898, 1927), the dendrologist for many years, summarized tree ranges in the two editions of his Check List of Forest Trees of the United States, Their Names and Ranges. Nearly a half century ago he undertook a rather large project of preparing a distribution map for each native tree species of North America, exclusive of those occurring wholly in Mexico. His assistants in a Section of Forest Distribution, chiefly W. H. Lamb, Georgia E. Wharton, and Mary C. Gannett, compiled on separate cards many thousand locality records for individual species, based upon published botanical lists, unpublished notes, and herbarium specimens. For each species these localities were plotted by number on a large cloth-backed contour map of North America.

Publication of these maps was begun by Sudworth (1913) under the title, Forest Atlas—Geographic Distribution of North American Trees. Only Part I—Pines, containing maps for 36

species of *Pinus*, ever appeared. However, some smaller maps of conifers, poplars, tree willows, and walnuts of the Rocky Mountain region were published in five later bulletins by Sudworth. It is unfortunate that the entire atlas, with a map for each native tree species, was not published in 1913 or soon afterwards, when the maps represented current knowledge. Sudworth's maps were compiled in the old days when field work was largely by horse and buggy, horseback, of foot from points along railroads and before the modern era of botanical exploration by automobile travel over networks of highways. Now these old maps are so far out-of-date that their value is chiefly historical.

Munns' Distribution of Important Forest Trees of the United States (1938) consisted of 170 maps, one for each important native tree species. These maps were based largely upon Sudworth's data and more recent data compiled from various publications by William W. Mitchell and others. This publication has been criticized because of various inaccuracies in the maps but was sufficiently popular to be reprinted. Incidentally, some errors noted by Professor Fernald in Preston's book appear to be traceable to these older, Forest Service maps.

Most of Munns' maps were redrafted on a smaller scale and often with slight revisions in the Forest Service series of leaflets known as American Woods, by Betts (1945). Areas of greatest commercial production were shown for several species.

Fairly accurate small distribution maps of many native tree species of the United States can now be prepared from existing published records. My first efforts, 165 small maps, appeared in my article, Important Forest Trees of the United States (Little, 1949a), in Trees, the Yearbook of Agriculture, 1949 (also reprinted as Yearbook Separate No. 2156), and may have been unnoticed by Professor Fernald.

These small yearbook maps were compiled hastily to meet a publication deadline from about 200 published references, supplemented by my own field experience in a few states. Sargent's Manual (1926) and Sudworth's Check List (1927) naturally were consulted, and maps of a few species were found in monographs and special publications. Blake and Atwood's (1942) bibliography of floras was an invaluable aid for location of references and was supplemented for recent titles by the excellent Botanical

Catalog in card form in the United States Department of Agriculture Library. The best publications for tree ranges in every state, chiefly state tree manuals and state floras, were examined. Very helpful published tree distribution maps were found for a few states, such as Illinois, Indiana, Kansas, Nebraska, and Wisconsin. Some local floras were checked, especially in states lacking modern state tree bulletins or floras. Where gaps occurred in the records, vegetation maps (Zon and Shantz, 1924), topographic maps, and a map of the counties in the United States were useful. Lack of time did not permit circulation of preliminary maps to interested critics, search for scattered published notes on range extensions, or examination of herbarium specimens.

Ranges in southern Canada were obtained from maps in Native Trees of Canada by the Canada Dominion Forest Service (1933; also revised in 1949), from Halliday and Brown (1943), and from floras of each province. Distribution in Mexico was not shown because of the limited, scattered published references available. Alaska was omitted, but the few tree species there have been mapped by Hultén (1941–1949).

Some excellent maps of forest types and tree distribution in certain states have been prepared in recent years by the U. S. Forest Service through its Forest Survey. Professor Fernald (1950) criticized Preston's (1948) first map, Forest Regions and Principal Types of Forest in the United States (credited by Preston to the Forest Service), because it did not show the pine forests of New England and New York. The revised Forest Service map of 1949, Areas Characterized by Major Forest Types in the United States, does show these pine forests of New England and New York!

Though most Forest Survey maps illustrate forest types, tree distribution maps of commercial forest trees have been published for a few states; for example, by Roberts and Cruikshank (1941a, 1941b) on North Carolina and South Carolina, by Evans (1942) on Virginia, and by Sternitzke and Duerr (1950) on Mississippi. These accurate maps showing by dots the density of occurrence of merchantable timber, rather than botanical or commercial range, were based upon intensive field surveys and measurements on thousands of uniformly spaced sample plots and upon infi-

nitely more field records than earlier maps. However, some maps of forest resources combined two or more related species having woods not distinguished commercially, such as all species of hickory, all species of ash, or all species of red oaks. Tree species of minor importance were not mapped.

Problems and Methods in Making Tree Distribution Maps

All who have prepared distribution maps of plant species are aware of the problems and difficulties involved. Maps of medium size no larger than an ordinary book page, such as commonly used in taxonomic monographs, probably are best for most purposes where space limits of the publication permit. Small maps, such as those of a field manual, sacrifice detail. However, large maps magnify inaccuracies and may not be better unless their base is also more detailed. As long as the exact limits of many native tree species are not accurately known within as much as 50 to 100 miles in less explored parts of their ranges, large maps are not justified.

The simplest kind of map, commonly employed in taxonomic monographs, is that based upon herbarium specimens, with a dot or other symbol representing each locality of record. This reliable map reveals clearly the supporting data and makes no attempt to fill in the gaps. However, a map limited to specimens shows where collectors have been rather than the various other places where the trees grow. These dot maps are satisfactory for many species of small and inconspicuous plants of interest primarily to specialists. More detailed maps are needed for trees, because of their size, dominance in the vegetation and landscape, economic importance, and widespread public interest.

On a map of a single state, distribution by counties can be shown clearly by a dot in each county of known occurrence. This method is adequate in states with small counties and where much collecting has been done, as illustrated by Gates (1938) in Kansas and Deam (1932) in Indiana. In states with numerous small counties some sight records may be substituted for specimens to save time and labor. Duncan (1950) in Georgia used a special type of card to simplify preparation of maps from sight records. Naturally maps based upon county records alone are

less accurate in the large western States with few counties and diverse topography.

The dot method was applied to the grasses of the United States by Hitchcock (1935; revised 1951) who used a small map of the United States for each species with a dot in each state where the species was known. This graphic summary of occurrence by states in addition to the usual text range might well be adopted by regional floras, including the next edition of Gray's Manual, and is being considered for the less important tree species in the forthcoming Forest Service Check List of the Native and Naturalized Trees of the United States.

Another simple method of mapping distribution is by a line along the species boundaries with one or several species on a map. However, isolated stations and areas within the main range where the species is absent cannot be shown clearly.

One of the best types is a small map of the United States on which distribution of a tree species is indicated by a dotted or stippled area. Dots are more natural than a line because the range limit is not a sharp line. If every tree were shown on a large scale map of a small area, the map would usually consist of dots with a border of scattered dots. Authors adopting this type for trees include: Hough (1907), Seton (1912), Mathews (1915), Preston (1940, 1948), Jacques (1940), Harlow and Harrar (1941), and Little (1949a).

Where two colors are permitted the range can be shown by a colored overlay on a black and white base map containing locality details. For example, a solid green overlay was used by Sudworth (1913 and later publications), Benson and Darrow (1945), and the Canada Dominion Forest Service (1949).

It is not easy to transfer the distribution limits of a tree species to a map, even after field observations. Inconspicuous individuals may be scattered many miles beyond the boundary of a certain forest type. On a small scale map outlying stations must be exaggerated, consolidated, or omitted because of cartological difficulties. Different persons using the same data might not compile identical maps. Boundaries of range in publications of adjacent states sometimes do not coincide. Minute details of some maps, such as restriction of certain species of moist sites to strips along the larger streams, tracing of boundaries exactly

from contour lines in mountains, and irregular dotted masses near range limits, imply an accuracy probably unwarranted by the basic data.

The distribution of several native tree species is complicated by cultivation, escaping, and naturalization beyond the original ranges. Where records are sufficient both the native and naturalized ranges should be distinguished on the same map. Other species may have become extinct in isolated stations or small portions of their natural range through destruction of habitats or cutting. Regions where exotic species or native species can be cultivated may be summarized by reference to numbered zones on a base map of the United States. Mulford's map of plant growth regions of the United States was adopted by Van Dersal (1938) for the ranges of native woody plants. Maps of hardiness zones based upon average annual minimum temperatures have been used by Rehder (1927), Little (1949b), and others.

Ordinarily density or abundance is not indicated on tree distribution maps except those based upon forest surveys. However, published maps of forest types or vegetation show distribution of the dominant tree species and indirectly the areas of greatest economic occurrence except on the vast areas where the forests have been destroyed.

Future Work

An atlas showing the distribution of each native tree species in the United States is still needed, and further delays may increase the difficulties of mapping.[1] The U. S. Forest Service, which had no dendrologist after Sudworth's death in 1927 until 1942, is the logical center for this work. As Sudworth (1913) remarked, the cooperation of many persons is needed, because no one can hope to accomplish this task from his own observations alone. During the next few years and with the assistance of Forest Service field personnel and others, I plan to compile distribution maps of each native tree species in the United States on a medium scale for publication in a single volume. The preliminary maps can be

[1] Useful, generalized distribution maps of the tree species of temperate North America and Eurasia, excluding small and shrubby trees, have been published by Theodor Schmucker (The Tree Species of the Northern Temperate Zone and Their distribution. Silva Orbis No. 4, 156 pp., illus. 1942). However, the 250 small-scale maps showing species boundaries by lines of different kinds lacked country and state boundaries and were below the desired standards of accuracy.

circulated in advance to a limited number of interested persons for revision. Of course, the published maps will be available to all who wish to use them, such as writers of tree books, just as Forest Service photographs and drawings of trees now are.

Suggestions and information for this project will be welcome. Instead of condemning further the inaccurate tree distribution maps already published, those interested should help make better ones. The greatest need now is for more articles or bulletins devoted to distribution maps of native tree species in a single state and prepared by an experienced resident botanist or forester. Published tree distribution records of some states still are rather meager and insufficient for plotting. Botanists and foresters are urged to publish at an early date articles containing their records on range extensions of trees from their collections, herbaria, or observations. (I should be very glad to receive reprints.) Duplicate specimens confirming these records should be deposited in one or more large herbaria as well as in the state or institution herbarium.

Corrections and range extensions of the 165 small maps in my yearbook article are welcome, as mentioned on page 764. I shall be glad to send two copies of Yearbook Separate No. 2156 to any interested persons who will be kind enough to return one copy with any corrections and range extensions marked on the maps with colored pencil (or shown on larger maps). (Yearbook Separate No. 2156 is also for sale by the Superintendent of Documents, Washington 25, D. C., at 15 cents a copy.)

Forest Service, United States Department of Agriculture,
Washington 25, D. C.

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CHROMOSOMES OF SPIRAEA AND OF CERTAIN OTHER GENERA OF ROSACEAE

J. T. Baldwin, Jr.

Chromosome numbers determined for various American—and one introduced—representatives of Rosaceae are recorded in Table I. Only plants of known geographic source are included. Counts were readily made from leaf smears. Diploid, tetraploid, and hexaploid expressions of a 9-series were found. Species previously in the chromosomal literature are discussed; others are merely listed in the table. Specimens collected by the author and cited are in the herbaria of U. S. National Arboretum and of the Smithsonian Institution. Those collected by Clover and Jotter are in the Herbarium of the University of Michigan.

Spiraea

Spiraea, a genus of about fifty species in the temperate zone of the northern hemisphere (Willis, 1948), is, of course, an assemblage of considerable horticultural importance. The relatively

Table I

	2n	Collector & No.
Spiraea alba Du Roi		
Virginia		
Fauquier Co.: near Paris	36	Baldwin 5603
Maryland		
Garrett Co.: Backbone Mountain	36	Baldwin 5650
West Virginia		
Grant Co.: Mount Storm	36	Baldwin 5645
Preston Co.: Masontown	36	Baldwin s. n.
Tucker Co.: Thomas	36	Baldwin s. n.
Spiraea latifolia (Ait.) Borkh., var. *septentrionalis* Fernald		
Virginia		
Page Co.: Hawksbill Mountain	54	Baldwin 5464, 5601
Spiraea tomentosa L., forma *albiflora* Macbr.		
Pennsylvania		
Crawford Co.: near Meadville	36	A. Lorz s. n.
Spiraea japonica L. f.		
Virginia		
Clarke Co.: near Paris	36	Baldwin 5668
Spiraea corymbosa Raf.		
Virginia		
Rappahannock Co.: Skyline Drive	36	Baldwin 5630
Warren Co.: Skyline Drive	36	Baldwin 5627
Physocarpus opulifolius (L.) Maxim.		
Virginia		
Clarke Co.: along Shenandoah River	18	Baldwin s. n.
Frederick Co.: Gore	18	Baldwin 5653
West Virginia		
Hampshire Co.: Romney	18	Baldwin 5654
Preston Co.: Masontown	18	Baldwin s. n.
Gillenia trifoliata (L.) Moench		
Virginia		
Clarke Co.: near Paris	18	Baldwin 5667
Rappahannock Co.: Skyline Drive	18	Baldwin 5632
Warren Co.: Skyline Drive	18	Baldwin 5633
Maryland		
Garrett Co.: Oakland	18	Baldwin 5640
West Virginia		
Grant Co.: Gormania	18	Baldwin s. n.
Hampshire Co.: Romney	18	Baldwin 5642
Neviusia alabamensis Gray		
Alabama		
Tuscaloosa Co.: near Tuscaloosa	18	Baldwin s. n.
Fallugia paradoxa (D. Don) Endl.		
Arizona: 26 miles below Lee's Ferry*	18	E. U. Clover & L. Jotter 2225
Cowania Stansburiana Torr.		
Arizona: Hermit Creek*	18	E. U. Clover & L. Jotter 2303A

* See map in Clover and Jotter (1941).

few chromosomal data now available for the genus indicate that a cytogeographic survey of *Spiraea* should be made: many problems in evolution would doubtless be thereby resolved; plants of significant value for breeding would probably be discovered. An example illustrates the point. Sax (1936) stated

that *S. corymbosa* has been used in making several interspecific hybrids and that this species "is a triploid with complete pollen sterility. It must form viable egg cells or exist in a fertile diploid form . . ." Perhaps diploid representatives do exist in *S. corymbosa*. Tetraploid ones do: along the Skyline Drive in Virginia the species is tetraploid. This information affords basis for interpreting certain of the artificial hybrids to which Sax referred. Existence of polyploidy within species makes it possible to build up a long series of horticultural plants.

Six species, two varieties, and one form of *Spiraea* are included in the eighth edition of Gray's Manual. Of the species only *S. virginiana* has not been cytologically studied.

Sax (1936) and the present author have found *S. alba* to be tetraploid. But, as stated above, Sax found *S. corymbosa* to be triploid, not tetraploid as reported here. And he found *S. japonica* to be diploid, and not tetraploid as it is in Clarke County, Virginia, where the species has become naturalized. Sax found *S. latifolia* to be tetraploid; its variety *septentrionalis* in Virginia (Baldwin, 1946) is hexaploid. *S. tomentosa* var. *alba* West as published by Bowden (1945) with an *n*-number of 18 and *S. tomentosa* forma *albiflora* given here with $2n = 36$ are designations of the same collection.

Hexaploidy in *Spiraea* is seemingly infrequent. Sax (1936) stated that *S. myrtilloides*, an Old World species, is hexaploid and that *S. Billiardii*, an artificial hybrid of two American species, may be hexaploid. The present author found a pink-spiked plant of undetermined identity cultivated at The Blandy Experimental Farm, Boyce, Virginia, to be hexaploid. *S. latifolia* var. *septentrionalis* atop Hawksbill Mountain, Page County, Virginia, is hexaploid. This variety likewise occurs "on the Labrador Peninsula and in Newfoundland and south to the Magdalen Islands and subalpine and alpine regions of Mt. Katahdin, Maine, and the White Mountains, New Hampshire, also on Keweenaw Peninsula, Michigan" (see Baldwin, 1946). Cytological examination of plants from some of these northern stations would be of phyletic interest.

Physocarpus and Neviusia

Sax (1931) reported an *n*-number of 9 for four species of *Physocarpus*, *P. intermedius* being among the four. This species

is included in the new Gray's Manual as var. *intermedius* of *P. opulifolius;* only *P. opulifolius* and this variety are recognized for the manual range. Sax (1931) recorded for *Neviusia alabamensis* an *n*-number of 8 but later (1932) stated that apparently the correct *n*-number is 9. The 2*n*-number of 18 given in Table I for this monotypic genus corroborates Sax's second report.

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Erroneous record of Borrichia frutescens from District of Columbia.—In the 8th edition of Gray's Manual (p. 1487. 1950) the range of the sea-ox-eye, *Borrichia frutescens* (L.) DC., is given as "borders of saline or brackish marshes, Florida to Texas and Mexico, north to eastern Virginia, and Anacostia River, D. C. July–Oct. (Bermuda)." (The abbreviations in the text here extended.) The species had never previously been reported from the District of Columbia region, and this record of an essentially maritime species so far up the Potomac River system as the Anacostia River was so remarkable as to arouse doubt as to its authenticity. Dr. Reed C. Rollins, to whom I applied for information, wrote me that there was a sheet in the Gray Herbarium labeled as follows: "Marsh along Anacostia River above Benning, District of Columbia, Aug. 28, 1925, *E. T. Wherry & F. W. Pennell 12417.*" This seemed definite enough, but the question still remained how the plant, which is entirely

unknown along the Potomac River or even Chesapeake Bay above its mouth, could have reached the Anacostia River without leaving at least some colonies in the more brackish areas along its route. The marsh above Benning Bridge on the Anacostia River is a typical fresh water marsh (in process of being destroyed by dumps) with no saline or even brackish character. Mr. F. M. Uhler, of the Fish and Wildlife Service of the Interior Department, informs me that in normal seasons the head of brackish water is about at the mouth of Aquia Creek, some 40 miles down the Potomac from Washington (in Stafford County, Virginia), and that while the underrun of saline water may in times of drought reach to Mt. Vernon or perhaps even farther up river, it is in no case sufficiently strong or sufficiently prolonged to influence the distribution of plant life. Correspondence with Dr. Wherry and Dr. Pennell, with an interim visit to the locality itself with James E. Benedict, Jr. (who, and not Wherry, had accompanied Pennell on this occasion, as his diary showed), finally solved the mystery. The entry of the number in question (12417) occurred in Pennell's notebook between the end of one day's collecting and the beginning of the next, on the opposite page from the main entries, and through a preparator's error the labels of this number were given the data of the collection above, which was from Benning Bridge, rather than that of the number below with which it rightly belonged. The specimens were actually collected by Wherry and Pennell in a salt marsh at Newport News, Virginia, on August 29, 1925.

The northernmost known locality for *Borrichia* appears to be Chincoteague Island, Northampton County, Virginia, on the Delmarva Peninsula, where it was collected by Dr. R. R. Tatnall, author of the *Flora of Delaware and the Eastern Shore*, on Sept. 13, 1928, in shallow salt water on edge of marsh on the border of the narrow inlet which separates Chincoteague Island from Assateague Island, just east of Chincoteague Island village. This locality is only five or six miles south of the Maryland line, but the species has never yet been found in Maryland, and Doctor Tatnall is inclined to believe that his locality may mark the extreme northern limit of the species.—S. F. Blake, Division of Plant Exploration and Introduction, Bureau of Plant Industry, Soils, and Agricultural Engineering, Beltsville, Maryland.

TWO COLOR-FORMS IN ERIOPHORUM.—

Eriophorum angustifolium Honck. f. **Scammanianum** Raymond, n. f. *A typo differt setis roseis.* **Alaska.** Nome. Aug. 3, 1949. *Edith Scamman 5350* (TYPE in the Herbarium of the Montreal Botanical Garden). Since *Eriophorum angustifolium* bears white setae, sometimes blackish in the closely related arctic *E. triste* (Fries) Hadač & Löve (Bot. Not. 1950: 34), this form with pink bristles is striking enough to merit taxonomic recognition. The same may be said of the form described below.

Eriophorum tenellum Nutt. f. **Gorhami** Raymond, n. f. *A typo differt setis subcaeruleis.* Differs from the type by its bluish bristles. **Nova Scotia.** Halifax. Growing in boggy field. Aug. 23, 1945. *E. Gorham 45–1409* (TYPE in the Herbarium of the Division of Botany and Plant Pathology, Department of Agriculture, Ottawa).

No trace of fungus infection has been found in any of the material upon which the author has based his descriptions. This point is mentioned because the distinctiveness of both varieties is dependent upon the color of the bristles. The author wishes to tender his thanks to Miss Edith Scamman, who has done noteworthy collecting in Alaska, and to Mr. James A. Calder, of the Division of Botany, Department of Agriculture of Canada, who kindly provided him with the specimens described herein.
—MARCEL RAYMOND, MONTREAL BOTANICAL GARDEN.

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